1.077 Nitrogen Oxides Emissions from Major population centers in Europe and Asia: First results from the EMeRGe field mission.

Presenting Author:

Helmut Ziereis, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany , helmut.ziereis@dlr.de

Co-Authors:

Michael Lichtenstern, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Paul Stock, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Hans Schlager, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Theresa Klausner, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Lisa Eirenschmalz, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Greta Stratmann, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Robert Baumann, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Heidi Huntrieser, Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

Andreas Zahn, Karlsruhe Institute of Technology, Institute for Meteorology and Climate Research, Karlsruhe, Germany

Maria Dolores Andrés Hernández, Institute of Environmental Physics, University of Bremen, Germany

John Burrows, Institute of Environmental Physics, University of Bremen, Germany

Abstract:

Major Population Centers (MPCs) are substantial sources of trace gases and particles. In this context nitrogen oxides are of special interest. On the local and regional scale nitrogen oxides impact directly and indirectly on human health. On all scales they impact on tropospheric chemistry contributing to the catalytic formation of ozone and the oxidizing capacity of air masses. They also control the lifetime of short lived hydrocarbons and long lived greenhouses gases like methane.
Within the EMeRGe (Effect of the Transport and Transformation of Pollutants on the Regional to Global scales) – project, aircraft measurements have been performed with the German research aircraft HALO (High Altitude and Long Range Research Aircraft) in the summer 2017 and spring 2018. In July 2017 the aircraft was based in Oberpfaffenhofen/Germany, whereas in March 2018 Tainan/Taiwan was the base for

Asian mission flights.
During the summer deployment phase, the pollution plumes of European MPCs such as London, Rome, the Ruhr area and the Po valley were probed. During the spring deployment phase aircraft measurements have been conducted to study the emission plumes from Asian MPCs in China, Philippines, Taiwan and Korea.
HALO was equipped with a comprehensive set of in-situ instruments for the measurement of different trace gases and aerosol parameters. Here, the focus is laid on the observation of nitric oxide and the sum of all reactive nitrogen species. These unique observations are presented and discussed together with other related and relevant trace gas observations. It was found that MPCs emissions lead to substantial enhancements in the nitrogen oxides burden especially in the boundary layer. Above the boundary layer the local MPC emissions are mixed with contributions from other sources such as the long range transport of biomass burning. Differences in the nitrogen oxides emission characteristics of European and Asian MPC are analysed